

Sub
B1

1 1. An inspection system for detecting a specific
2 material of interest in items of baggage or packages,
3 comprising:
4 a multi-view X-ray inspection probe constructed to
5 employ X-ray radiation transmitted through or scattered from
6 an examined item to identify a suspicious region inside said
7 examined item;
8 an interface system constructed and arranged to
9 receive from said X-ray inspection probe X-ray data
10 providing spatial information of said suspicious region;
11 a directional, material sensitive probe connected to
12 and receiving from said interface system said spatial
13 information; said material sensitive probe constructed to
14 acquire material specific information about said suspicious
15 region; and
16 a computer constructed to process said material
17 specific information to identify presence of said specific
18 material in said suspicious region.

1 2. The inspection system of claim 1 wherein said
2 multi-view X-ray inspection probe comprises
3 an X-ray exposure system constructed to expose said
4 examined item at multiple locations to a fan beam of X-ray
5 radiation; and
6 an X-ray detection system positioned to detect X-ray
7 radiation transmitted through or scattered from said
8 examined item; and
9 a processor operatively connected to receive data
10 from said X-ray detection system programmed to identify said
11 suspicious region.

1 3. The inspection system of claim 2 wherein said
2 X-ray detection system includes an array of X-ray
3 transmission detectors positioned to detect X-ray radiation
4 transmitted through said examined item.

1 4. The inspection system of claim 2 wherein said
2 X-ray detection system includes an array of back-scatter X-
3 ray detectors positioned to detect X-ray radiation back-
4 scattered from said examined item.

1 5. The inspection system of claim 2 wherein said
2 X-ray detection system includes an array of forward-scatter
3 X-ray detectors positioned to detect X-ray radiation
4 forward-scattered from said examined item.

1 6. The inspection system of claim 2 wherein said X-
2 ray exposure system generates said fan beam of X-ray
3 radiation at least two substantially different energies.

1 7. The inspection system of claim 1 wherein said
2 directional, material sensitive probe is a coherent X-ray
3 scatter probe.

1 8. The inspection system of claim 7 wherein said
2 coherent X-ray scatter probe includes
3 an X-ray source constructed and arranged to emit a
4 collimated pencil beam of X-rays that irradiate said
5 suspicious region; and
6 a position sensitive X-ray detector constructed to
7 detect X-rays scattered from said suspicious region.

1 9. The inspection system of claim 8 wherein said
2 coherent X-ray scatter probe further includes a source
3 filter constructed and arranged to filter said collimated
4 pencil beam.

1 10. The inspection system of claim 8 wherein said
2 coherent X-ray scatter probe further includes a detector
3 filter, located in front of said position sensitive
4 detector, constructed to filter X-rays scattered from said
5 suspicious region.

1 11. The inspection system of claim 1 further
2 comprising a graphical interface and a display constructed
3 to display spatial information of said examined item.

1 12. The inspection system of claim 1 further
2 comprising a user interface constructed and arranged to
3 enable interactive communication with said inspection
4 system.

Sub B2
a
1 13. An inspection system for detecting a specific
2 material of interest in items of baggage or packages,
3 comprising:
4 a multi-view X-ray inspection probe constructed to
5 employ X-ray radiation transmitted through or scattered from
6 *an* ~~a~~ examined item to identify a suspicious region inside said
7 examined item;
8 an interface system constructed and arranged to
9 receive from said X-ray inspection probe X-ray data
10 providing spatial information of said suspicious region;
11 a material sensitive probe connected to and
12 receiving from said interface system said spatial

24

13 information; said material sensitive probe constructed to
14 acquire material specific information about said suspicious
15 region; and
16 a computer constructed to process said material
17 specific information to identify presence of said specific
18 material in said suspicious region.

1 14. The inspection system of claim 13 wherein said
2 material sensitive probe is one of the following: a Compton
3 X-ray scatter probe, a Raman probe, an infrared probe, an
4 NQR probe, a dielectrometer probe, a millimeter wave
5 (microwave) probe.

Sub B3
a 1 15. An X-ray inspection method of detecting a
2 specific material of interest in items of baggage or
3 packages, comprising:
4 employing X-ray radiation transmitted through or
5 scattered from ^{an} examined item to obtain multi-view spatial
6 information about the examined item;
7 identifying from said spatial information a
8 suspicious region inside said examined item;
9 employing a directional material sensitive probe to
10 acquire material specific information about said suspicious
11 region; and
12 identifying, based on computer-processing, presence
13 of said specific material in said suspicious region.

1 16. The X-ray inspection method of claim 15 wherein
2 said step of employing X-ray radiation comprises
3 exposing said examined item at multiple locations to
4 a fan beam of X-ray radiation;

5 detecting X-ray radiation transmitted through or
6 scattered from said examined item; and
7 processing detected X-ray data to identify said
8 suspicious region.

1 17. The X-ray inspection method of claim 16 wherein
2 said step of detecting X-ray radiation includes detecting X-
3 ray radiation transmitted through said examined item.

1 18. The X-ray inspection method of claim 16 wherein
2 said step of detecting X-ray radiation includes detecting X-
3 ray radiation back-scattered from said examined item.

1 19. The X-ray inspection method of claim 16 wherein
2 said step of detecting X-ray radiation includes detecting X-
3 ray radiation forward-scattered from said examined item.

1 20. The X-ray inspection method of claim 16 wherein
2 said exposing step is performed by generating at least two
3 substantially different energies of said fan beam.

1 21. The X-ray inspection method of claim 15 wherein
2 said step of employing said directional, material sensitive
3 probe includes irradiating said suspicious region by a
4 focused beam of X-rays and detecting coherently scattered X-
5 rays to acquire material specific X-ray data.

1 22. The X-ray inspection method of claim 21 wherein
2 said irradiating step includes emitting a collimated pencil
3 beam of X-rays toward said suspicious region.

1 23. The X-ray inspection method of claim 21 wherein
2 said detecting step includes employing a position sensitive
3 X-ray detector.

1 24. The X-ray inspection method of claim 21 wherein
2 said detecting step includes employing an energy sensitive
3 X-ray detector.

1 25. The X-ray inspection method of claim 21 further
2 includes filtering said collimated pencil beam.

1 26. The X-ray inspection method of claim 21 further
2 includes filtering X-rays scattered from said suspicious
3 region.

1 27. The X-ray inspection method of claim 15 further
2 includes displaying spatial information of said examined
3 item.

1 28. The X-ray inspection method of claim 15 further
2 includes receiving commands from an operator via a user
3 interface.

Sub 24
1 29. An X-ray inspection method of detecting a
2 specific material of interest in items of baggage or
3 packages, comprising:
4 employing X-ray radiation transmitted through or
5 scattered from a examined item to obtain multi-view spatial
6 information about the examined item;
7 identifying from said spatial information a
8 suspicious region inside said examined item;

9 employing a material sensitive probe to acquire
10 material specific information about said suspicious region;
11 and
12 identifying, based on computer-processing, presence
13 of said specific material in said suspicious region.

1 30. The X-ray inspection method of claim 29 wherein
2 said step of employing said material sensitive probe
3 includes utilizing one of the following: a Compton X-ray
4 scattered radiation, a Raman spectrum, an infrared spectrum,
5 a nuclear quadrupole resonance effect, *a wave of microwave*
a *energy modified by* ~~modified wave of~~
a ~~microwave energy by~~ dielectric material property, and
7 reflected millimeter wave (microwave) field.

*Add
B 57*